5   Attempt any two parts

(a) Perform the crossver (crossover probability 0.5) and mutation operatn (mutation probability 0.25) at fourth site oh th following four parent strings and obtain new off- srings

Parent 1 = 0 1 0 0 0 1 1 0 1 1

Parent 2 = 1 0 0 0 1 0 1 1 0 0

Parent 3 = 0 1 (1 0 1 1 0 1 1

Parent 4 = 111 1 1 1 0 0 1 11

(b) Discuss the varous steps of algorithm for simulated Annealing in optimization.

(c) Explain the procedure of Neural Network algorithm

—x—

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 244201

Roll No ☐☐☐☐☐☐☐☐☐

M. Tech. (Sem. II)

THEORY EXAMINATION 2014-15

OTPIMIZATION FOR ENGINEERING DESIGN

Time : 3 Hours]   *[Total Marks : 100*

Note: Attempt all the questions.

1   Attempt <u>any two</u> parts

(a) Find the second order Taylor's series approximation of the function   57

$$f(X_1, X_2, X_3) = X_2^2 X_3 + X_1 e^{X_3}$$

(b) Find the extreme points of the function

$$f(X_1, X_2) = X_1^3 + X_2^3 + 2X_1^2 + 4X_2^2 + 6$$ 63

(c) A beam of uniform rectangular cross-section is to be cut from a log having a circular cross-section of diameter $2a$. The beam has to be used as a cantilever beam of fixed length to carry a

concentrated load at the free end Find the dimensions of the beam using Lagrange multiplier method that corresponds to the maximum tensile (bending) stress carrying capacity

2 Attempt any two parts

(a) Find the solution using the Lagrange multiplier method

$$\min f(x, y) = kx^{-1}y^2 \text{ subject to } g(x, y) = x^2 + y^2 - a^2$$

(b) Consider the minimization of the function

$$f(X_1, X_2) = 6X_1^2 + 2X_2^2 - 6X_1X_2 - X_1 - 2X_2$$

If $S_1 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$, denotes a search direction

Find the direction S_2 which is conjugate to the direction S_1

302

(c) Discuss the various steps of Zoutendijk's method for optimization   371

3. Attempt any two parts :

(a) Minimize $f(X_1, X_2) = X_1 - X_2 + 2X_1^2 + 2X_1X_2 + X_2^2$, with the starting point (0, 0) using Variable metric's Method

339

(b) Minimize $f(X_1, X_2) = X_1 X_2 + 2X_1^2 + 2X_1X_2 + X_2^2$ with the starting point (0) using Univariate method

274

(c) Explain the steps of algrithm for Powel's method of Unconstrained Optimzation

4 Attempt any two parts

(a) It has been decided to sift grain from a warehouse to a factory in an open rectangular box of length X_1 meter, width X_2 meter, ad height X_3 meters The bottom, sides, and the ends of the box cost, respectively, Rs 80, Rs 10 and Rs 20 per meter square It costs Rs 1 for each round trip of the box Assuming that box will have no salvage value, find the minimum cost of transporting 80m³ of grains

447

(b) Discuss the exterior function methodology in detail for constrained optimization method   418

(c) Using Geometric programming,

Find $X = (X_1 X_2 X_3)^T$ so as to minimize $f(X) = (20X_1X_3 + 4X_2X_3 + 80 X_1 X_2)$, subject to $80/X_1X_2X_3 \leq 10$

40

483